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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,363	07/01/2002	Gary Lock	5621	6875
6858	7590	03/02/2004	EXAMINER	
BREINER & BREINER 115 NORTH HENRY STREET P. O. BOX 19290 ALEXANDRIA, VA 22314			OLSEN, KAJ K	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/031,363

Applicant(s)

LOCK ET AL.

Examiner

Kaj Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

ultrasonic  
radiator

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. During the PCT prosecution, applicant amended claim 13 to specify the use of a "highly non-uniform" electric field, and the PCT examiner objected to both new terms. This examiner is in partial agreement with that conclusion. In particular, this examiner does not object to the use of new term "non-uniform" because dielectrophoretic force is by definition a force applied with a non-uniform field (see USPTO definitions for class 204, subclasses 547 and 643). However, this examiner does find the addition of term "highly" to not be enabled by the originally filed disclosure.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 9 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. With respect to claim 9, "the electrode" should be --the electrode array--.

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1. Claim 12 specifies that the ultrasonic vibration and the varying electric field are being applied in different planes. First, it is unclear how the applicant is defining the planes in question. Looking at fig. 1 as a guide, what would the plane be for the vibrations generated by transducers 10 and 11? Would it be a plane parallel or perpendicular to surface 1? Similarly, what is the plane for the dielectrophoretic force generated by array 20? As near as the examiner can discern, the planes for both would be parallel with surface 1, which brings up an additional point. How does the instant invention teach the use of differing planes? As stated above, it would appear that the ultrasonic transducers (either 10 and 11 or 12 and 13) apply vibrations that are in the same plane as the force generated by electrode array 20. Although one could define a plane for the vibrations that are not the same as the plane for vibrations, the whole limitation drawn to different planes would become meaningless because one can mentally define planes that are both different and not different.

2. Although it is possible applicant is referring to a plane of movement of the particles, that movement is never defined. Moreover, even that doesn't appear to rectify the problem that even if the vibrations and force are moving particles in perpendicular directions (e.g. the embodiment shown in fig. 4d), those two directions are still in the same plane (i.e. the plane defined by surface 1). Clarification is requested.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by either SU 744,285 or WO 98/04355 A1.

5. SU '285 discloses a method of manipulating particles comprising subjecting the particles to both ultrasonic vibrations and to a varying electric field that induces a dielectrophoretic force. See the figure and the abstract. Similarly, WO '355 teaches the subjection of particles to a dielectrophoretic force and also teaches that the force can be additionally joined with other forces such as ultrasonic. See p. 4, lines 11-14. An ultrasonic force is inherently a vibrational force. Although these references do not explicitly refer to applying these forces in different planes, as discussed above, the examiner does not consider this limitation to read free of *any* arrangement of ultrasonic vibration and dielectrophoretic force because a plane could be utilized for defining either the ultrasonic or dielectrophoretic planes. Hence this limitation does not read free of *any* arrangement of both an ultrasonic and dielectrophoretic force.

#### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-8, 10, 11, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over either SU '285 or GB '355 in view of Schram (USP Re. 33,524).

9. As disclosed above, the SU '285 and GB '355 references set forth all the limitations of claim 1, but do not explicitly disclose the use of a moving ultrasonic standing wave. SU '285 is presumably drawn to a stationary standing wave (in view of the use of a fixed frequency) and GB '355 does not specify any particular form of ultrasonic vibration. However, the use of moving standing waves for particle separation is old in the art. In particular, Schram teaches that utilizing moving ultrasonic waves allows one greater separation of the particles based on their ultrasonic properties. See abstract and col. 4, lines 46-66. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Schram for the method of either SU '285 or GB '355 in order to allow for greater particle separation than would be possible with the use of stationary standing waves. In addition, moving waves allow one to move particle without the need for a separate flow impelling means.

10. The various claims drawn to how or when the ultrasonic waves are applied at different times are all within the purview of one possessing ordinary skill in the art. In particular, both techniques provide separation to different particles in different ways. Whether the ultrasonic vibrational separation is performed before or after the dielectrophoretic separation ) entirely depends on which sequence provides greater separation of the particles. Although SU '285

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appears to teach applying the vibrations and the dielectric force at the same time, one possessing ordinary skill in the art would recognize that either force can be cycled on or off provided one is willing to forgo the advantages of having both forces applied at the same time.

11. For the claims drawn to applying these forces at the same time, both SU '285 and GB '355 set forth applying the forces at the same time. In SU '285, see abstract, in GB '355 see p. 4, lines 11 and 12.

12. Claim 11 is rejected in the alternative under 35 U.S.C. 103(a) as being unpatentable over SU '285 with or without the teaching of either GB '355 or Schram.

13. Claim 11 is rejected in the alternative under 35 U.S.C. 103(a) as being unpatentable over GB '355.

14. SU '285 sets forth all the limitations of the claim, but apparently does not teach the use of different frequencies. According to the applicant, SU '285 utilized the same frequency in order to garner maximum field strength (see pp. 3 and 4 of the disclosure). However, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize different frequencies if one is willing to forgo the maximum field strength that one gets utilizing the same field frequency. Taking a step back in the art requires only routine skill.

15. Alternatively, both GB '355 and Schram provide motivation for why one would want to vary the frequency utilized for the dielectrophoretic force and ultrasonic vibration respectively. In particular, GB '355 teaches that varying the frequency allows one to maximize the collection (fig. 4a-4c). Schram teaches that varying the frequency allows one to find the optimize the separation (see abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to vary the frequency of either the ultrasonic vibration or

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dielectric force (as taught by GB '355 or Schram respectively) in order to tailor the frequencies such that maximum separation can be achieved. If it is obvious to vary the frequencies, then utilizing different frequencies would inherently follow.

*Allowable Subject Matter*

16. Claim 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

17. Claim 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: With respect to claim 9, the prior art does not disclose nor render obvious a method comprising all the limitations of claim 8 and further comprising the utilization of the moving standing wave to move the particles across an electrode array and utilizing the electrode array to divert the various particles as specified. With respect to claims 14, the prior art does not disclose nor render obvious all the limitations of claim 13 and further comprising the set forth combination of separation and input chambers being transverse to each other and each having a pair of transducers.



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*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 4:30 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Kaj Olsen', with a long horizontal flourish extending to the right.

Kaj Olsen Ph.D.  
Primary Examiner  
AU 1753  
February 20, 2004